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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/933,822

08/22/2001

Xavier Michel

SON-2199

7278

23353

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07/16/2004

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EXAMINER

EDWARDS, PATRICK L

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 07/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/933,822

Applicant(s)

MICHEL, XAVIER

Examiner

Patrick L Edwards

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-2, 4-5 and 10-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

With regard to claims 1, 4, 5 and 10-12, the recited “edge enhancement means” is not described in the ‘detailed description’ section of the specification or shown in any of the figures. The ‘summary of the invention’ section of the specification recites an “edge enhancement means” exactly as it is recited in the claim, but fails to provide any further detail regarding the functionality of the “edge enhancement means”.

With regard to claim 2, the specification mentions the terms ‘loose connection’ and ‘tight connection’ in several different places (and provides repeated recitations of a single example of a loose connection such as in paragraphs [0063] and [0075]), but fails to provide a clear definition for these terms.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2, 3, 8 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to claim 2, the metes and bounds of the terms “loose connection” and “tight connection” are not clear as recited in the claims. The specification provides an example of a loose connection in an image (paragraph [0174] of the applicant’s specification), but fails to provide a clear definition of either term.

Further referring to claim 2, the claim recites converting a loose connection of an original image into a tight connection prior to calculating the local energy. This conversion process, which the applicant defines as an ‘edge connecting process’ in the specification (see paragraph’s [0165] and [0174]), requires prior knowledge of edge direction (see paragraph [0174]). Claim 2, however, recites performing this process before the calculation of local energy. Since edge direction detection is based on local energy (per claim 1), it isn’t clear how this ‘edge connecting process’ can be performed prior to the calculation of local energy. It appears as if claim 2 is in contradiction with the claim from which it depends.

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With regard to claim 3, the above argument with respect to claim 2 applies to claim 3 as well.

Further referring to claim 3, the term "said energy conversion means" lacks antecedent basis. Claim 3 depends on claim 2, which in turn depends back to claim 1. Claim 1 recites "energy calculating means" and claim 2 recites "edge conversion means", but neither of these claims recites an "energy conversion means". Consequently, it isn't clear whether the "said energy conversion means" recited in claim 3 is referring to the "energy calculating means" from claim 1, the "edge conversion means" from claim 2, or something else entirely.

Claim 8 states that consistency is judged in terms of the local structure of an interpolated pixel. The claim further recites that interpolation is performed on the basis of the judged consistency. These two statements, however, appear to contradict each other. For instance, how can a pixel be interpolated based on consistency when the consistency is judged based on an interpolated pixel? Additionally, how can a consistency judgement be made based on an interpolated pixel, when the pixel is interpolated based on consistency? As can be seen, the two contradictory statements recited in the claim create a paradox which make the claim unclear and indefinite.

With regard to claim 10, the value 'N' has no antecedent basis and it isn't made clear what this value is supposed to represent.

Further referring to claim 10, the metes and bounds of the phrase(s) "processes which are to be performed" as recited in the claim are not clear. These "processes" have no antecedent basis in the claims. Which processes are performed when Z is equal to 2? Which ones are performed when Z is less than 2?

Additionally referring to claim 10, the claim recites that, when the value of Z is greater than 2, the interpolation means and edge enhancement means perform, N times, the processes that are performed when Z is equal to 2. The claim goes on to recite that the interpolation means and edge enhancement means perform, one time, the processes that are performed when Z is equal to 2 or smaller. Please note that when Z is equal to 2, it meets both of these conditional statements (i.e. it is equal to 2 and less than or equal to 2). Consequently, it isn't clear whether the claim is meant to recite that when Z is greater than 2, that the interpolation means and edge enhancement means perform, N+1 times, the processes that are performed when Z is equal to 2, or something else entirely? Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

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subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 5-7, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Aoyama et al. (USPN 6,535,651).

With regard to claim 1, which is representative of claim 11, Aoyama discloses an energy calculating means for calculating local energy of an original image (col. 5 lines 49-51). The 'image density gradient vector' disclosed in Aoyama qualifies as 'local energy' as recited in the claim.

Aoyama further discloses a detections means for detecting the direction of an edge on the basis of the local energy calculated by the energy calculating means (col. 42 line 60 – col. 43 line 4 and col. 25 line 65 – col. 26 line 6).

Aoyama further discloses interpolation means for interpolating a new pixel from a pixel of said original image on the basis of the direction of the edge detected by the detection means (col. 29 line 14 – col. 30 line 56). The cited Aoyama excerpt shows several examples of how a new pixel is interpolated on the basis of the detected edge direction.

Aoyama further discloses edge enhancement means for performing an edge enhancement process on the basis of said local energy calculated by said energy calculating means (col. 35 lines 29-67 and col. 39 lines 36-48 in conjunction with Figure 12). The combination of elements 44', 43', 45' and 60 as disclosed in Figure 12 of Aoyama is analogous to the claimed edge enhancement means. The cited passage details how the 'local energy' (i.e. the image density gradient vector) is used to determine coefficients for a coefficient correction operation which is analogous to the claimed 'edge enhancement process' in that it produces sharp image edge portions (col. 39 lines 47-48).

The limitations recited in the preamble of the claim which are not included in the claim body have not been given any patentable weight and will not be discussed. Please refer to MPEP § 2112.02 for further information regarding limitations recited in the preamble of a claim.

With regard to claim 12, a computer-readable recording medium that stores a program which causes the computer to execute the steps of a method is essential if the image processing method disclosed in Aoyama is to function. Therefore, a computer-readable recording medium is inherent in the teachings of Aoyama.

With regard to claim 5, Aoyama discloses that the interpolation means and the edge enhancement means perform the interpolation and the edge enhancement upon the original image in vertical and horizontal directions (col. 33 line 57 – col. 34 line 3).

With regard to claim 6, Aoyama discloses interpolating one new pixel from two pixels lying along the detected edge direction (col. 29 lines 29-38).

With regard to claim 7, Aoyama discloses performing linear interpolation when the edge is not detected by the detection means (col. 4 lines 55-59). The 'flat portion' of the image as disclosed in Aoyama is analogous to the claimed situation where an edge is not detected by the detection means (aoyama col. 4 lines 19-28). Aoyama

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generically discloses an 'interpolating operation process' in the cited passage, but later goes on to specify that this interpolation process can be a linear interpolation (Aoyama col. 41 lines 13-14 and 50-51).

With regard to claim 10, Aoyama discloses a size enlargement scale factor which is analogous to the factor Z recited in the claim (Aoyama col. 39 line 59). Aoyama further discloses that when this value is four, the interpolation means and edge enhancement means performs 2 times the processes that are performed when this value is two (Aoyama col. 39 lines 60-65). Consequently, we can conclude that the value N (from the claim) is equal to half of the scale factor disclosed in Aoyama.

Further referring to claim 10, Aoyama discloses that two processes are performed when the scale factor is two (the two values of 't' will result in two iterations of equation 44 (Aoyama col. 39 line 1), these iterations are analogous to the claimed 'processes'). It follows that when the scale factor is less than 2 (e.g. one) the interpolation and edge enhancement means would perform this process only once, since there would be only 1 value for 't' which would result in only 1 iteration of equation 44. Consequently, Aoyama discloses all of the limitations of the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Klassen (USPN 6,741,751). The arguments as to the relevance of Aoyama as applied above are incorporated herein.

With regard to claim 2, Aoyama fails to expressly disclose converting a loose connection of the original image into a tight connection before increasing the resolution of the image. Klassen, however, discloses connecting and strengthening edges in an image before increasing the resolution of said image (Klassen col. 3 lines 22-53). This operation (which is commonly referred to as anti-aliasing) is analogous to the claimed conversion of a loose connection to a tight connection, per the applicant's specification (see paragraph [0174]). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Aoyama's resolution increasing apparatus by connecting and strengthening the edges of an image before increasing resolution as taught by Klassen. Such a modification would have allowed for a system with improved rendition of text and synthetic graphics in the output image (Klassen col. 3 lines 43-44).

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With regard to claim 3, Klassen discloses a system for anti-aliasing an input image before increasing its resolution (Klassen col. 5 lines 3-6). The claimed process of replacing the value of a particular pixel with the mean value of two pixels on the basis of pixels lying along a diagonal line is a common method of anti-aliasing which is very old and well known in the art (Official Notice). It would have been obvious to one reasonably skilled in the art at the time of the invention to specify that Klassen's anti-aliasing system replaced a pixel value with the mean value of two pixels lying along a diagonal line. Such a modification would have allowed for a simple and well known method of producing cleaner, more well defined edges in an image.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Moronaga et al. (USPN 5,229,864). The arguments as to the relevance of Aoyama as above are incorporated herein.

With regard to claim 4, Aoyama discloses comparing a local energy calculation to a threshold to determine the existence of an edge, but fails to expressly disclose that the detected edges are enhanced by using a one-dimensional filtering process, such that the values of pixels are multiplied by corresponding coefficients of a 1-D edge building filter, and the respective products are added together. Moronaga, however, explicitly recites a one-dimensional filter for edge enhancement (Moronaga col. 6 lines 38-68). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Aoyama's image processing apparatus by enhancing the edges with a 1D filter as taught by Moronaga. Such a modification would have allowed for well known method of accentuating the edges of the image (Moronaga col. 6 lines 65-68).

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Yamashita et al. (USPN 5,513,281). The arguments as to the relevance of Aoyama as applied above are incorporated herein.

Claim 8 recites a 'consistency judging means' for judging consistency in terms of an interpolated pixel. The claimed term 'consistency', is a value that is based on the differences between pixels. Aoyama teaches that pixels which lie on the same edge in an image have similar values (i.e. they have 'consistency') (Aoyama col. 25 lines 42-48). It follows that if the differences between pixels on a same line are large, then we can conclude from Aoyama's teachings that the line that connects those two pixels does not represent an edge. The Yamashiti reference, however, explicitly (as opposed to Aoyama's implicit teaching) discloses checking the consistency values of interpolated pixels on specific lines to determine the existence of an edge. Yamashiti further teaches that when no such edge exists, a linear interpolation should be applied (Yamashiti col. 3 lines 4-10). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Aoyama's interpolation apparatus by checking the consistency of pixels on a detected edge to ensure that the edge was not detected erroneously as

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taught by Yamashiti. Such a modification would have allowed for less noise and increased resolution (Yamashiti col. 3 lines 24-26)

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Ng et al. (USPN 5,450,531). The arguments as to the relevance of Aoyama as applied above are incorporated herein.

With regard to claim 9, Aoyama discloses calculating local energy, but fails to expressly disclose creating an energy map. Ng, however, discloses creating a gradient map for every pixel in an input image (Ng Figure 1 elements 12 and 14 with col. 4 line 67 – col. 5 line 5). The gradient magnitude map disclosed in Ng is analogous to the claimed energy map. It would have been obvious to one reasonably skilled in the art at the time of the invention to modify the Aoyama's energy calculating means by using the calculated local energies for each pixel to create an energy map as taught by Ng. Such a modification would have allowed for an apparatus that saved the calculated energy values for each pixel in an input image and consequently avoid repeated calculations. This would have made for a faster, more efficient system.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (703) 305-6301. The examiner can normally be reached on 8:30am - 5:00pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

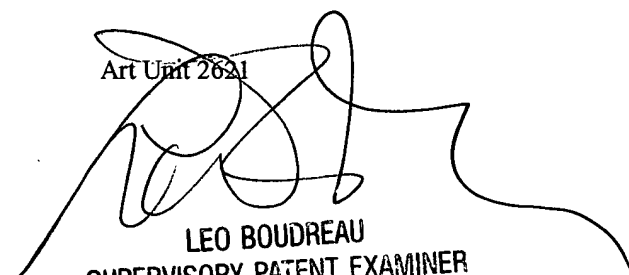
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Patrick Lynn Edwards

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